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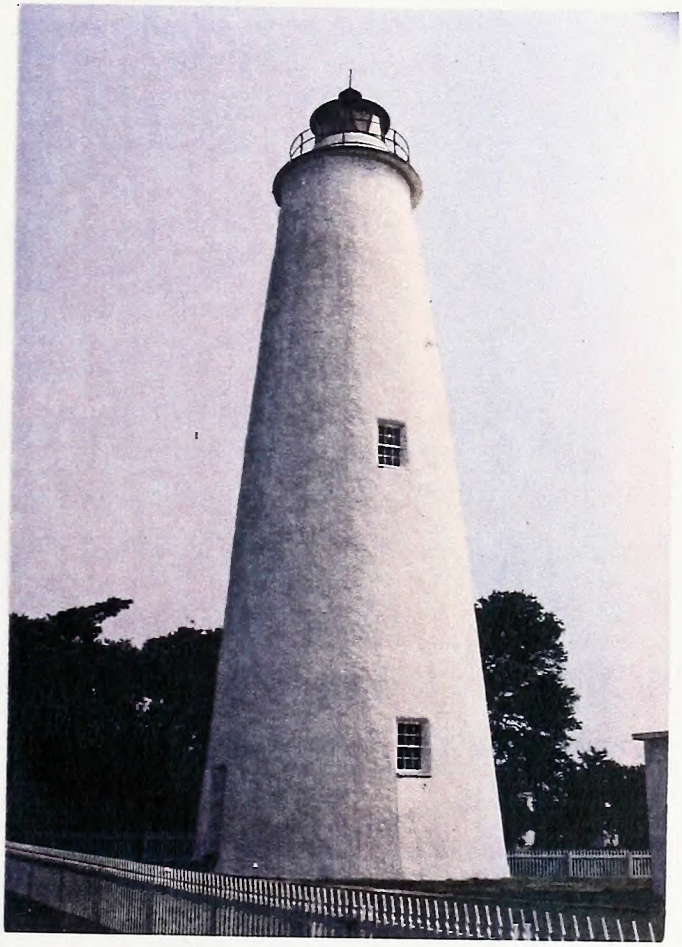
North Carolina Department of Transportation
Statewide Planning Branch
Small Urban Planning Unit

Thoroughfare Plan

for

HYDE COUNTY



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THOROUGHFARE PLAN

FOR

HYDE COUNTY

Prepared by the:

Statewide Planning Branch
Division of Highways
North Carolina Department of Transportation

In Cooperation with:

The Community of Ocracoke
Hyde County
The Federal Highway Administration
U.S. Department of Transportation

March 1993

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Chapter 1

INTRODUCTION

Hyde County is located on the coast of North Carolina. This County is bounded on the north by Washington, Tyrell, and Dare Counties, on the west by Beaufort County, on the south by the Pamlico and Carteret Counties, and on the east by the Atlantic Ocean.

The Pamlico Sound divides the County into two regions, the mainland and Ocracoke Island. The mainland includes Swan Quarter and the Lake Mattamuskeet National Wildlife Refuge. Ocracoke Island is a barrier island of the "Outer Banks". The Island is connected to other portions by three ferries. The Island contains Ocracoke Village which is located on the widest and southernmost part of the Island. Ocracoke Island is part of the Cape Hatteras National Seashore Recreation Area.

Hyde County lies in the Coastal Plain Flatwoods region. The topography of the County is generally flat, with elevations ranging from zero to eighteen feet above sea level. Approximately ten percent of Hyde County's land area includes coastal wetlands. The estuarine waters are among the most productive natural environments of Hyde County. The waters support the valuable commercial and sports fisheries of the coastal area that are comprised of estuarine dependent species such as flounder, shrimp, crabs, and oysters.

Public gamelands occupy large portions of Hyde County. These include: Lake Mattamuskeet National Wildlife Refuge; Pungo National Wildlife Refuge; Swan Quarter National Wildlife Refuge; Pocosin Lakes National Wildlife Refuge; and Gull Rock State Gameland. These areas attract tourists and are socially and economically important to Hyde County. The Lake Mattamuskeet and Swan Quarter National Wildlife Refuges are particularly significant to the economy. These two areas offer the most fertile water fowl hunting area in North Carolina, and attract many hunters and fishermen. The U.S. Department of Interior and U.S. Fish and Wildlife Service have acquired 27,890 acres of Hyde County land to establish a new national wildlife refuge in Hyde, Tyrell, and Washington Counties, called the Pocosin Lakes Wildlife Refuge.

This County has no incorporated municipalities. Hyde County is appealing to industry because of its availability of open space, low tax and wage structure, and few urban problems. However, the County's lack of public sewer system and prevalence of unsuitable hydric soils make Hyde County less attractive to development.

In February 1991, Hyde County requested the development of a

thoroughfare plan. The staff from Statewide Planning met with the local officials to determine the transportation needs of the area. The main interest was traffic circulation on Ocracoke Island during the peak summer period, an area very attractive to tourism.

There are many benefits to be derived from thoroughfare planning, but the primary objective is to enable the transportation system to be progressively developed so that it will adequately serve future traffic demands in the Hyde County area. In addition, the thoroughfare plan should embody those details of accepted thoroughfare planning principles which are discussed in Chapter 2. Major and minor thoroughfares were located based on field investigation, aerial photos, existing and anticipated land uses, and topographic conditions.

Some major benefits to be derived from thoroughfare planning are:

(a) A minimum amount of land will be required for street and highway purposes;

(b) Local citizens will know which streets will be developed as major thoroughfares and thus will have assurance that their residential street will not one day become a major traffic carrier; and

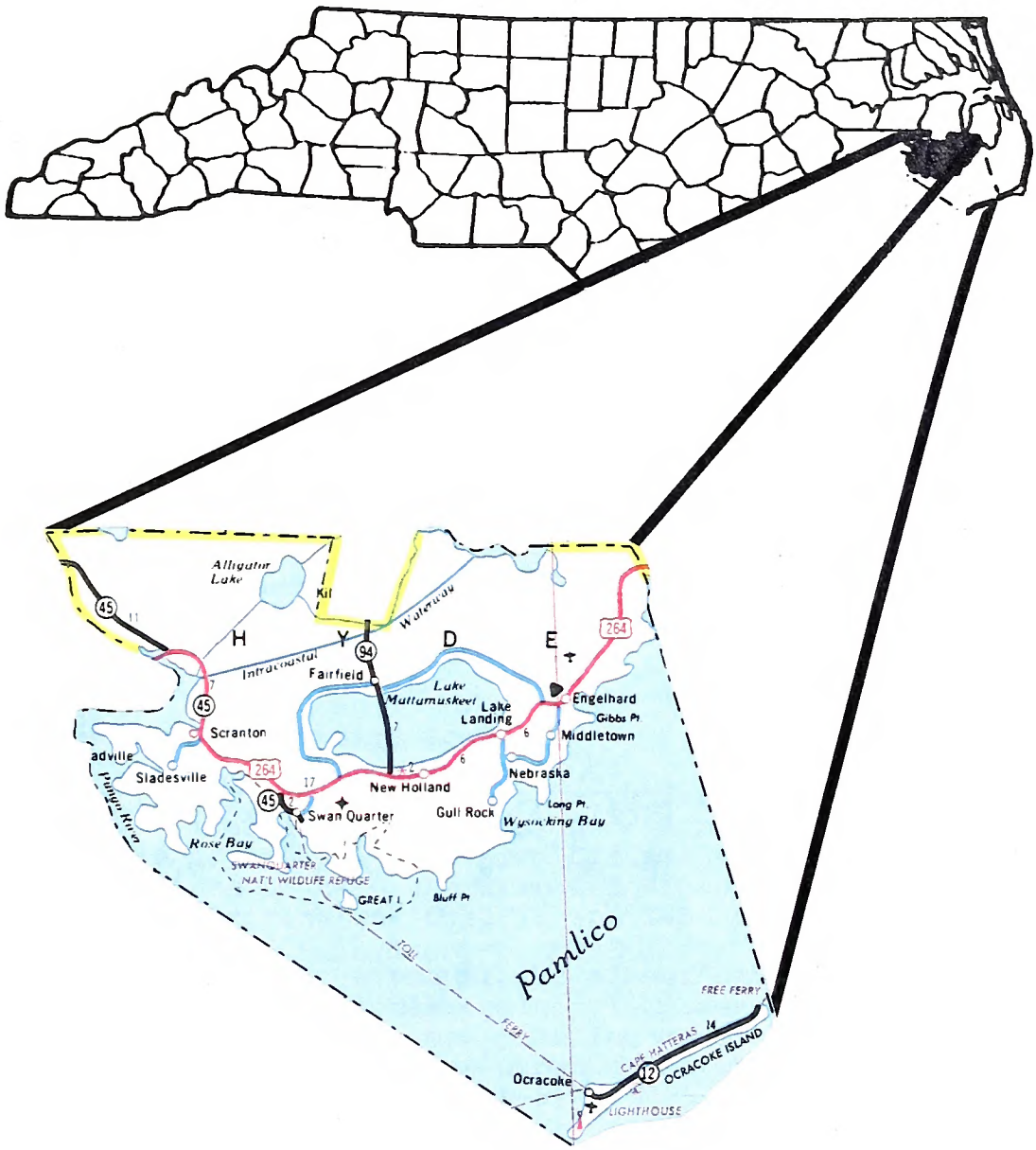
(c) Land developers can design their subdivisions so that subdivision streets will function in a non-conflicting manner with the thoroughfare plan.

The thoroughfare plan is based on existing traffic, population, and land use data. Year 2020 average daily traffic (ADT) projections were used to determine capacity deficiencies. The adopted thoroughfare plan is expected to meet the traffic demands of Hyde County for the planning period from 1991-2020.

The North Carolina Department of Transportation and Hyde County are jointly responsible for the proposed thoroughfare improvements. Cooperation between the local and state governments is of primary concern. The plan has been mutually adopted by all parties and it is the responsibility of the local government to implement the plan following the guidelines set forth in Chapter VI. Hyde County adopted the plan on September 8, 1992, and the North Carolina Board of Transportation adopted the plan on November 6, 1992.

It should be emphasized that the adopted plan is based on anticipated growth of the area as currently perceived. Prior to construction of specific projects, a more detailed study will be required to reconsider development trends and to determine specific locations and design requirements.

GEOGRAPHIC LOCATION



HYDE COUNTY

NORTH CAROLINA

FIGURE 1

Chapter 2

COUNTY THOROUGHFARE PLANNING PRINCIPLES

There are many advantages to thoroughfare planning, but the primary mission is to assure that the road system will be progressively developed to serve future travel desires. The main consideration in thoroughfare planning is to make provisions so when the need arises, feasible opportunities to make improvements exist.

Benefits of Thoroughfare Planning

There are two major benefits derived from thoroughfare planning. First, each road or highway can be designed to perform a specific function and provide a specific level of service. This permits savings in right-of-way, construction, and maintenance costs. It also protects residential neighborhoods and encourages stability in travel and land use patterns. Second, local officials are informed of future improvements and can incorporate them into planning and policy decisions. This will permit developers to design subdivisions in a non-conflicting manner, direct school and park officials to better locate their facilities, and minimize the damage to property values and community appearance that is sometimes associated with roadway improvements.

County Thoroughfare Planning Concepts

The underlying notion of the thoroughfare plan is to provide a functional system of streets, roads, and highways that permit direct, efficient, and safe travel. Different elements in the system are designed to have specific functions and levels of service, thus minimizing the traffic and land service conflict.

In the county plan, elements are either urban or rural. In the urban planning area, the local municipality generally has planning jurisdiction. Outside the urban planning area, the county has planning jurisdiction. In those urban areas where no urban thoroughfare plan exists, elements are rural and are under the planning jurisdiction of the county.

Within the urban and rural systems, plan elements are classified according to the specific function they are to perform. A discussion of the elements and functions of the two systems follows.

Thoroughfare Classification Systems

Streets perform two primary functions, traffic service and land access, which when combined, are incompatible. The conflict is not serious if both traffic and land service demands are low. When

traffic volumes are high, conflicts created by uncontrolled and intensely developed abutting property lead to intolerable traffic flow friction and congestion.

The idea of the thoroughfare plan is that it provides a functional system of streets that permit travel from origins to destinations with directness, ease and safety. Different streets in this system are to perform specific functions, thus minimizing the traffic and land service conflict.

A. Urban Classification

In the urban thoroughfare plan, elements are classified as major thoroughfares, minor thoroughfares, or local access streets.

Major Thoroughfares are the primary traffic arteries of the urban area providing for traffic movements within, around, and through the area.

Minor Thoroughfares collect traffic from the local access streets and carry it to the major thoroughfare system.

Local Access Streets provide access to abutting property. They may be further classified as either residential, commercial and/or industrial depending upon the type of land use that they serve.

Due to the limited amount of detail that can be shown on a county thoroughfare plan, only urban major thoroughfares are shown.

The coordinated system of major thoroughfares that is most adaptable to the desired lines of travel within an urban area is the radial-loop system. The radial-loop system includes radials, crosstowns, loops, and bypasses. Radial thoroughfares provide for travel from points outside to major destinations inside the urban area. Crosstown thoroughfares provide for traffic movement across the central area and around the central business district (CBD). Loop thoroughfares provide for lateral travel movements between suburban areas. Bypasses carry non-local traffic around and through the area. Occasionally, a bypass with low through traffic volumes can be designed to function as a portion of the urban loop. Figure 2 illustrates the idea of the radial-loop major thoroughfare system and the functionally classified urban street system.

IDEALIZED THOROUGHFARE PLAN

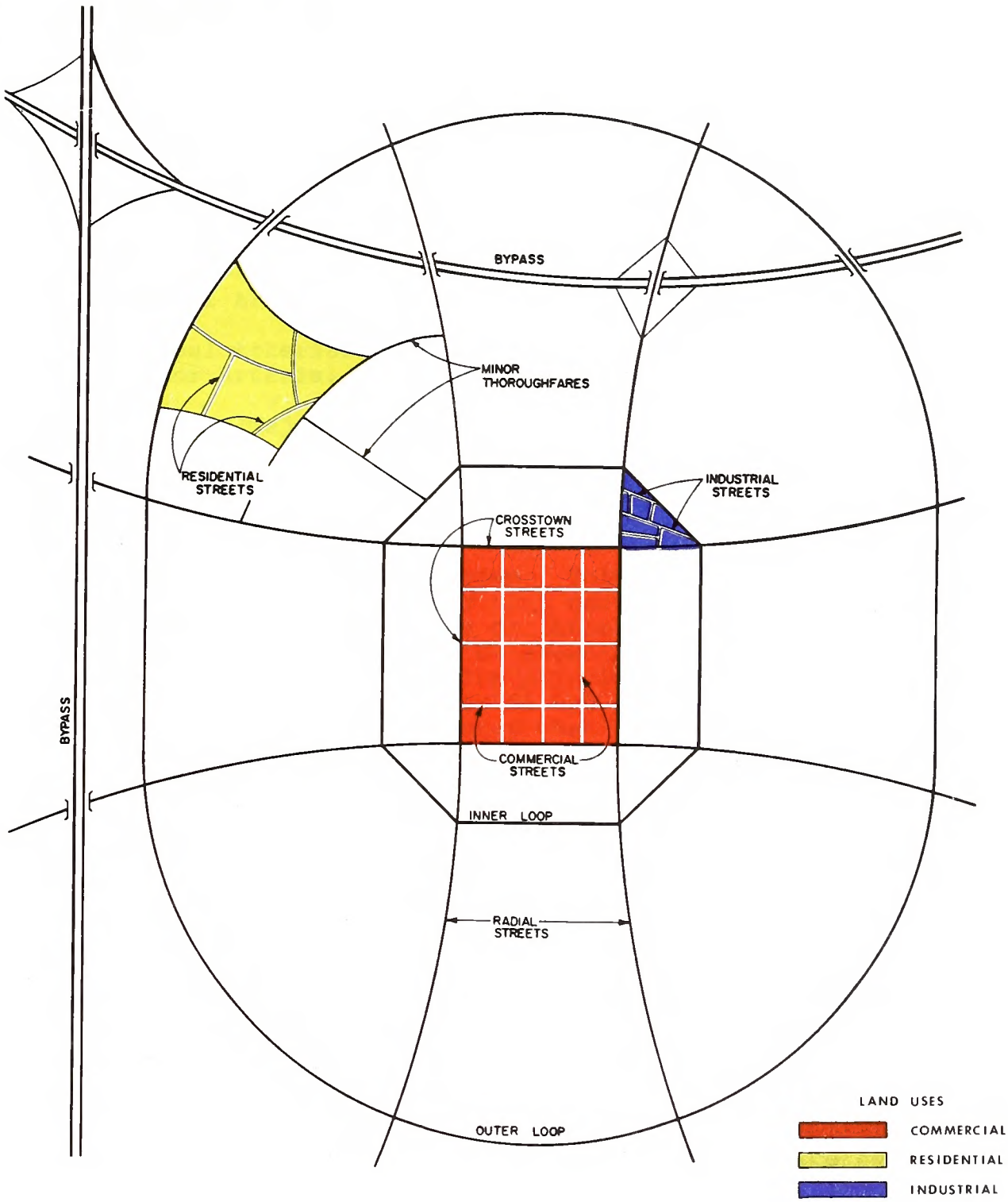


FIGURE 2

B. Rural Classification

The facilities outside the urban thoroughfare planning boundaries make up the rural system. There are four major systems: principal arterials; minor arterials; major and minor collectors; and local roads. Table 1 shows the generally accepted average statewide mileage on these systems.

TABLE 1

Rural System Road Mileage Distribution

Systems	Percentage of Total Rural Miles
Principal Arterial System	2-4
Principal Arterial System plus Minor Arterial Road System	6-12
Collector (Major and Minor) Road System	20-25
Local Road System	65-75

Rural Principal Arterial System: This system is a connected network of continuous routes that serve corridor movements having substantial statewide or interstate travel characteristics. This will be shown by both the trip lengths and the travel densities. The principal arterial system should serve all urban areas of over 50,000 population and most of those with a population greater than 5,000. The Interstate system constitutes a significant portion of the principal arterial system.

Rural Minor Arterial System: This system forms a network that links cities, larger towns, and other major traffic generators such as large resorts. The minor arterial system generally serves intrastate and intercounty travel and travel corridors with trip lengths and travel densities somewhat less than the principal arterial system.

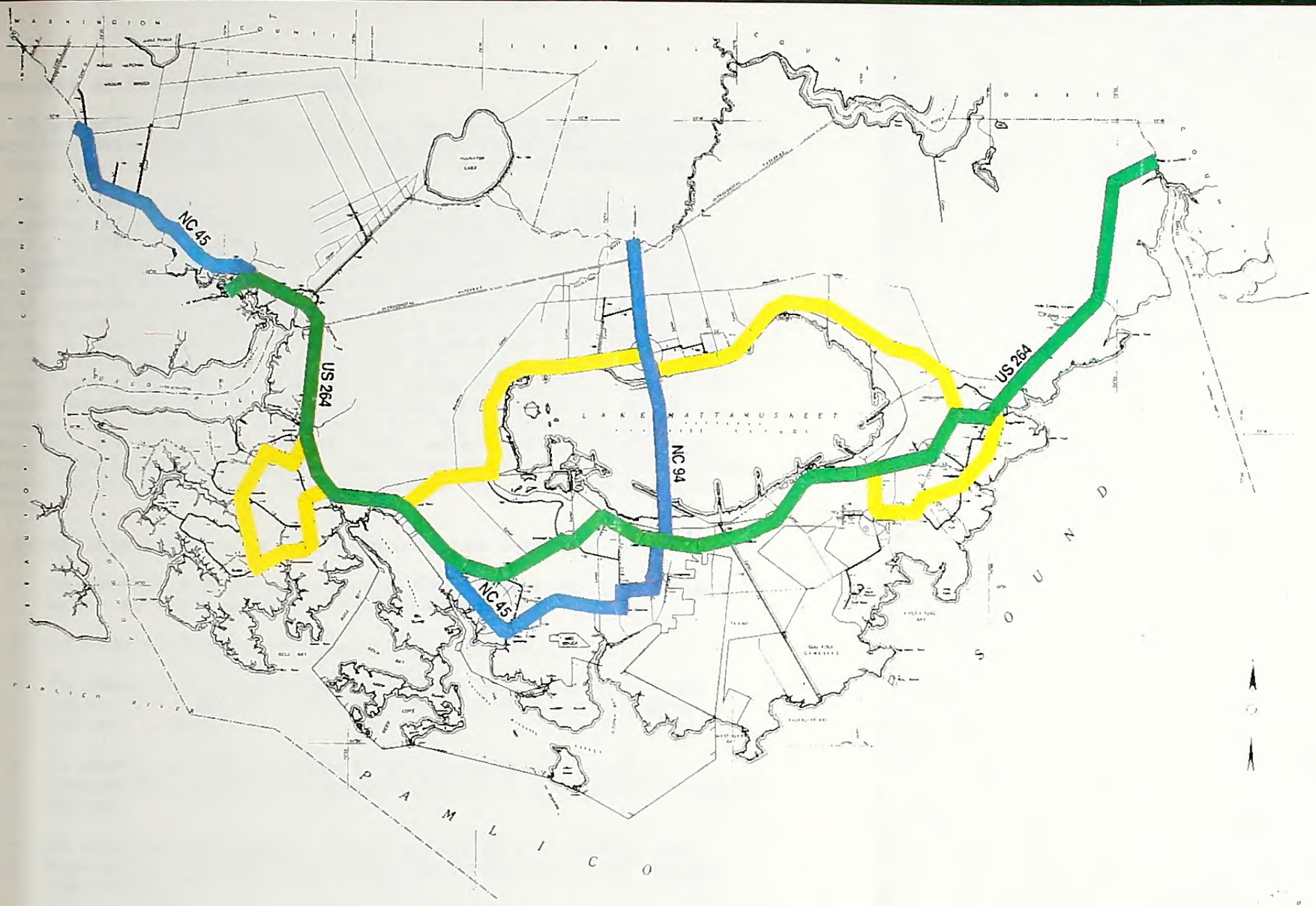
Rural Collector Road System: The rural collector routes generally serve intracounty travel. These routes serve travel whose distances are shorter than on the arterial routes. The rural collector road system is subclassified into major and minor collector roads.

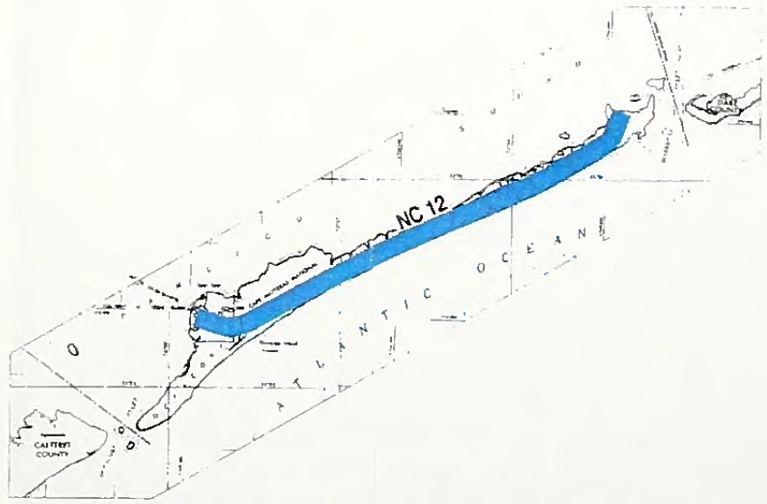
Major Collector Roads: These routes provide service to the larger towns not directly served by the higher systems and to other traffic generators of equivalent intracounty importance, such as consolidated schools, shipping points, county parks,

FIGURE 4
FUNCTIONAL CLASSIFICATION

LEGEND

- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- MINOR COLLECTOR





HYDE COUNTY

NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS – PLANNING AND RESEARCH BRANCH
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

Objectives of Thoroughfare Planning

Thoroughfare planning is the process public officials use to assure the development of the most appropriate street system to meet the existing and future travel desires within the urban area.

The primary aim of a thoroughfare plan is to guide the development of the street system in a manner consistent with changing traffic demands. Through proper planning for street development, costly errors and needless expense can be averted. A thoroughfare plan will enable street improvements to be made as traffic demands increase, and eliminate unnecessary improvements. By developing the street system to keep pace with increasing traffic demands, a maximum utilization of the system can be attained that will require a minimum amount of land for street purposes. The thoroughfare plan also should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The location of present and future population, commercial and industrial enterprises, affects major street and highway locations. Conversely, the location of major streets and highways within the County will influence the urban development pattern.

Other objectives of a thoroughfare plan include:

- To provide for the systematic development of an adequate major street system as land development occurs;
- To reduce travel and transportation costs;
- To reduce the cost of major street improvements to the public through the coordination of street system with private action;
- To enable private interests to plan their actions, improvements, and development with full knowledge of public intent;
- To minimize disruption and displacement of people and businesses through long range planning for major street improvements;
- To reduce environmental impacts such as air pollution, resulting from transportation; and
- To increase travel safety.

These objectives can be achieved by improving both the operational efficiency of thoroughfares, and improving the system efficiency through system coordination and layout.

A. Operational Efficiency

A street's operational efficiency improves by increasing the capability of the street to carry vehicular traffic and people. In terms of vehicular traffic, a street's capacity is the maximum number of vehicles that can pass a given point on a roadway during a given time under prevailing roadway and traffic conditions. The physical features of the roadway, nature of traffic, and weather also affect capacity. Physical ways to improve vehicular capacity include:

Street widening - widening a street from two to four travel lanes more than doubles the capacity by providing additional maneuverability for traffic.

Intersection improvements - increasing the turning radii, adding exclusive turn lanes, and channelizing movements can improve the capacity of an existing intersection.

Improving vertical and horizontal alignment - reduces the congestion caused by slow moving vehicles.

Eliminating roadside obstacles - reduces side friction and improves a driver's field of sight.

Operational ways to improve street capacity include:

Control of access - A roadway with complete access control can often carry three times the traffic handled by a non-controlled access street with identical lane width and number.

Parking removal - Increases capacity by providing additional street width for traffic flow and reducing friction to flow caused by parking and unparking vehicles.

One-way operation - The capacity of a street can sometimes be increased 20-50%, depending upon turning movements and street width, by initiating one-way traffic operations. One-way streets also can improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.

Reversible lanes - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.

Signal phasing and coordination - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

Altering travel demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced or altered in the following ways:

Carpools - Encourage people to form carpools and vanpools for journeys to work and other trip purposes. This reduces the number of vehicles on the roadway and raises the people carrying capability of the street system.

Alternative mode - Encourage the use of other modes of travel such as transit and bicycles.

Work hours - Encourage industries, business, and institutions to stagger work hours or establish variable work hours for employees. This will reduce travel demand in peak periods and spread peak travel over a longer time period.

Land use - Plan and encourage land use development or redevelopment in a more travel efficient manner.

B. System Efficiency

Another means of altering travel demand is the development of a more efficient system of streets that will better serve travel desires. A more efficient system can reduce travel distances, time, and cost. Improvements in system efficiency can be achieved through the concept of functional classification of streets and development of a coordinated major street system.

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of operational efficiency, system efficiency, functional classification, and idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice, thoroughfare planning is constrained by existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these and the many other factors that affect major street locations.

Throughout the thoroughfare planning process it is necessary from a practical viewpoint that certain basic principles be followed as closely as possible. These principles are as follows:

1. The plan should be derived from a thorough knowledge of today's travel and its component parts, as well as the factors that contribute to it, limit it, and modify it.

2. Traffic demands must be sufficient to warrant the designation and development of each major street. The thoroughfare plan should be designed to accommodate a large portion of all major traffic movements on a relatively few streets.

3. The plan should conform to and provide for the land development plan of the area.

4. Certain considerations must be given to urban development beyond the current planning period. Particularly in outlying or sparsely developed areas which have development potential, it is necessary to designate thoroughfares on a long-range planning basis to protect rights of way for future thoroughfare development.

5. While being consistent with the above principles and realistic in terms of travel trends, the plan must be economically feasible.

Chapter 3

EXISTING CONDITIONS

The objective of thoroughfare planning is to develop a transportation system that will enable people and goods to travel safely and economically. To determine the needs of an area the factors of population, economics, and travel demand must be examined. To plan for the transportation needs of an area, it is also important to understand and define major routes, accident problems, and locations with capacity deficiencies.

To fulfill the objectives of an adequate 20-year thoroughfare plan, reliable forecasts of future travel characteristics must be made. Such forecasts are possible only when the following major items are carefully analyzed: (1) historical and potential population changes; (2) significant trends in the economy; (3) character and intensity of land development; and (4) motor vehicle registration and use. Additional items that vary in influence include the effects of legal controls such as zoning ordinances and subdivision regulations, availability of public utilities and transportation facilities, and topographic and other physical features of the area.

To assess the needs of a transportation network, it is essential that the general characteristics of the existing system be analyzed. These characteristics include, but are not limited to, design, roadway safety, and structural elements. Any deficiencies in these areas should be reduced, if not eliminated, to provide the most efficient transportation system possible.

Population Trends

The volume of traffic on a section of roadway is a function of the size and location of the population it serves. Analysis of the population is the first step for a transportation planner to estimate future population and the traffic that it will generate with some degree of reliability.

In Hyde County and Ocracoke, much of the travel originates outside the immediate area on US 264 and NC 94 for pleasure and agricultural related jobs in the county. NC 12, along the North Carolina coastline, is the only highway access through the chain of islands known as the Outer Banks. Many trips on NC 12 are for pleasure such as sight seeing and fishing. The ferry system provides access to Ocracoke Island. Population trends and projections for Hyde County and Ocracoke are shown in Table 2. Hyde County township trends are shown in Table 3.

TABLE 2

Population Trends and Projections

Year	Hyde County	Ocracoke
1960	5,765	-
1970	5,571	541
1980	5,873	658
1990	5,411	713
2000	5,058[1]	983[2]
2010	4,707[1]	1,012[2]
2015	4,629[1]	1,042[2]
2020	4,326[1]	1,074[2]

[1]Projections for Hyde County taken from Office of State Planning, State of North Carolina, 1991.
[2]Ocracoke Island projections assumed the same rate of percentage in population as Hyde County, and does not take into account future annexations or the potential for enhanced growth should water and sewer services become available.

Table 3

Hyde County Township Trends

Year	1960	1970	1980	1990
Currituck	1128	1133	1302	1184
Fairfield	573	541	582	487
Lake Landing	2453	2377	2217	2027
Ocracoke	475	541	658	713
Swan Quarter	1121	958	1098	985
Unorganized	15	21	16	15
Totals	5,765	5,571	5,873	5,411

Table 2 indicates that Hyde County experienced a population decline of 6.1% from 5,765 persons in 1960 to 5,411 persons in 1990. Hyde County has a well dispersed, rural populace with no municipalities in the county. Hyde County has the lowest population density in North Carolina and the second smallest total population in the state (Tyrrell County has 3,856).

Hyde County had a population decline of 7.9% from 5873 persons in 1980 to 5411 persons in 1990, The population decline was the highest rate among the state's twenty coastal counties, and results from a lack of employment opportunities.

Hyde County could experience growth with new industry and increases in tourism. With the introduction of development, traffic in Hyde County will grow over the next thirty years. Improvements to existing facilities and the construction of new roads will be imperative to handle this additional growth.

In 1988, a seasonal demographic analysis of recreational populations for the Albemarle-Pamlico region was prepared by Paul D. Tschetter of East Carolina University. Based on the ECU study of recreational populations, all of North Carolina's coastal counties experienced dramatic growth in seasonal housing from 1980 to 1990. The most significant growth observed was in private seasonal housing in the coastal counties, particularly on the barrier islands. Motel and hotel growth in the 33 counties surveyed was highest in Hyde, Carteret, and Dare Counties.

In the ECU study, "peak seasonal population" is the population that would be enumerated in all seasonal housing units if all units were occupied at full capacity, based on average assumed household sizes for each type of unit. Although "peak seasonal population" is based on a number of variables, it is a very useful statistic for planning purposes, since it provides a logically derived summary of the possible total occupancy in seasonal units during peak overnight tourism periods that can be converted into trips per household for transportation purposes. Table 4 shows a summary of the peak seasonal population for coastal counties in the Albemarle-Pamlico Estuarine Study Area.

Table 4

Summary of Peak Seasonal Population for Coastal Counties in Albemarle-Pamlico Estuarine Study Area, 1980-90[1]

County/Type of Seasonal Unit	Peak Seasonal Population 1980	1990	Percent Increase 1980-90
Hyde - Total	3,463	8,046	132.3
Private DU's	2,052	5,491	167.6
Motels/Hotels	357	1,237	246.4
Campgrounds	927	927	0.0
Marinas	127	391	208.1
Carteret - Total	42,940	77,433	80.3
Private DU's	29,016	58,571	101.9
Motels/Hotels	5,344	9,115	70.6
Campgrounds	5,097	5,811	14.0
Marinas	3,483	3,936	13.0
Currituck - Total	4,852	5,820	20.2
Private DU's	3,742	4,720	26.1
Motels/Hotels	42	42	0.0
Campgrounds	945	945	0.0
Marinas	123	123	0.0
Dare - Total	44,137	73,332	66.1
Private DU's	22,149	47,019	112.3
Motels/Hotels	9,856	13,953	41.6
Campgrounds	11,154	11,154	0.0
Marinas	978	1,206	23.3

[1] Tschetter, Paul D., "Characterization of Baseline Demographic Trends in the Year-Round and Recreational Populations in the Albemarle-Pamlico Estuarine Study Area"

Economy and Employment

The Hyde County mainland has depended heavily on its land and water resources to support its local economy. Manufacturing, retail trade, and tourist related activities have not significantly benefited the mainland economy. Services and government employment have been important to the mainland economy and have provided some stabilizing influence.

From 1970 to 1980, the total employed labor force increased by 12.1%. The employed labor force fell from a high of 2,830 in 1980 to the 1990 total of 2,547, a decrease of 10.0%. Annual swings

in employment will continue to occur because of fluctuations in the agriculture and commercial fishing industries. The economy did show some significant 20-year gains in per capita income, total personal income, and gross retail sales, which were consistently spread over the period.

Services, transportation, communication, farming, and public utilities experienced declines in earnings and absolute employment. The decline in services, which include service to the agricultural industry, is believed to be a result of the decreasing number of farms and decreasing holdings of private forest/timberlands. The decline in public utilities reflects the lack of population growth and increased automation in the industry. Actual farm employment decreased from 1970 to 1990 due to the growth of large corporate farms and increasing mechanization. The number of small family farms has steadily declined since 1970. Non-farm employment has increased, but at approximately one-sixth the growth of non-farm earnings. Most of the non-farm growth has occurred in Ocracoke, further emphasizing the disparity between the mainland and Ocracoke economies. The greatest non-farm mainland employment growth occurred in the government category, with state and local government leading the increase.

Manufacturing showed only small gains in employment, with a 1970 total of 165 jobs, increasing to 245 by 1990. Stable manufacturing employment continues to be a critical Hyde County mainland need. Hyde County is appealing to industry because of its availability of open space, low tax and wage structure, and few urban problems. However, the county's lack of public sewer system and prevalence of unsuitable hydric soils, make Hyde County less attractive to development.

Travel Demand

Travel demand is generally reported in average daily traffic counts. Traffic counts are taken regularly at several locations in and around Hyde County by the North Carolina Department of Transportation. To estimate future travel demand, traffic trends over the past twenty years were studied. Figure 5 shows the 1991 Average Daily Traffic (ADT) volumes on State highways in Hyde County and Ocracoke.

The ADT counts were compared to the capacity of the roadway. Capacity is defined as the maximum amount of traffic that can be accommodated by a given facility. To obtain a rating of excellent to poor, six levels of service are used. The levels are designated from A to F representing an operating level-of-service (LOS). A represents the best operating conditions and F the worst. They are further defined in the Capacity Analysis section of this report.

A comparison of annual growth rates from 1983 to 1990 at various count locations in Hyde County shows average annual growth

rates ranging from 0.0% to 5.0%. The largest growth was noted on US 264. Appendix A and Figures 5 and 6 show expected average traffic volumes based on growth rates of 2.5% (moderate growth) to 3.5% (high growth). These lower projections are being used because it is very difficult for an area to sustain an annual growth rate of over four percent. Likewise, it is uncommon for an area to maintain a growth rate less than two percent.

Major Routes

Hyde County is served primarily by US 264, which runs in a east-west direction through the middle of the County from Dare to Beaufort County. This facility is the major highway in the County located south of Lake Mattamuskeet, and is the connecting point for many small communities in the county, including Engelhard, Amity, Rose Bay, and Scranton. US 264 also provides access to the Hyde County Airport.

NC 94 is the only north-south route in the county, crossing near the middle of Lake Mattamuskeet and extending northward from US 264, crossing the Intracoastal Waterway, to the Town of Columbia in Tyrrell County. NC 94 provides access to Fairfield.

NC 45 extends from Beaufort County where it intersects NC 99 and then runs parallel to the Pungo River in Hyde County intersecting US 264 at Ponzer community. NC 45 then runs simultaneous with US 264 where it extends in a southeasterly direction and is the major highway into the county seat at Swan Quarter. NC 45 provides access to small communities such as Rose Bay and Scranton.

NC 12 is the only highway on Ocracoke Island which extends most of the length of the Island. NC 12 connects the Hatteras Island Ferry Port and the Swan Quarter Ferry Port, and provides access to Ocracoke Village.

There are several secondary roads serving the rural communities of the county. North Lake Drive (SR 1311), Turn Pike Road (SR 1304), and Piney Woods Road (SR 1305) act as a loop type facility around Lake Mattamuskeet, a national wildlife refuge.

Other streets in the planning area are residential. All routes in Hyde County are two-lane facilities.

Hyde County has many means of transportation. Three ferries serve Ocracoke Island, one from Hatteras Island (approximately 40 minutes) in Dare County, one from Swan Quarter (approximately 2 hours and 30 minutes) in Hyde County, and one from Cedar Island in Carteret County (approximately 2 hours and 15 minutes). The Intracoastal Waterway flows through Hyde County from the Alligator River in Dare County to the Pungo River in Beaufort County. The County also has an airport maintained by Hyde County and is located

approximately three miles northeast of Engelhard with a 4700-foot, paved, lighted runway.

Traffic Accidents

Traffic accident records are of assistance in locating problem areas on the highway system. The cause of traffic accidents can be broken down into three general categories: the physical environment; the driver; and the vehicle. The physical environment includes such things as road condition, weather, road obstruction, and traffic conditions. Causes associated with the driver include the driver's mental alertness, distractions in the car, ability to handle the vehicle, and reaction time. Causes associated with the physical attributes of the vehicle itself include such things as the condition of the brakes and tires, vehicle responsiveness, size of the vehicle, and how well the windshield wipers and defroster work. All traffic accidents can be attributed to one or more of these factors; however, the driver is often the primary factor.

Accident data from January 1989 through December 1991 was studied as part of the development of this report. Requests for accident data were made for locations having five or more accidents. There were no locations of this type in Hyde County. The largest number of accidents occurred on Ocracoke Island according to the Hyde County Deputy Sheriff stationed on the Island. However, this accident data did not enter the files of the North Carolina Motor Vehicle Department because most of the accidents resulted in under $500 in damages. Drivers involved in minor accidents were given a "short form" by the local sheriff on duty for exchanging insurance information. Most of these accidents occurred in parking lots at the various commercial establishments and restaurants around the Island. When a member of the North Carolina Highway Patrol was called, a trooper would have to come from the mainland of Hyde or Dare County on the ferry, resulting in a two-to-five hour wait for a trooper to arrive at the scene. Due to the time involved, most drivers preferred changing information for insurance purposes.

Capacity Analysis

A good indication of the adequacy of the existing major street system is a comparison of the traffic volumes with the ability of the streets to move traffic freely at a desirable speed. The ability of a street to move traffic freely, safely, and efficiently with a minimum delay is controlled primarily by the spacing of major devices utilized. Thus, the ability of a street to move traffic can be increased by restricting parking and turning movements, using proper sign and signal devices, and by the application of other traffic engineering techniques.

Capacity is the maximum number of vehicles that has a reasonable expectation of passing over a given section of a roadway in one direction, or in both directions, during a given period under

prevailing roadway and traffic conditions.[1] The relationship of traffic volumes to the capacity of the roadway will determine **level of service** being provided. Six levels of service have been selected to identify the conditions existing under various speed and volume conditions on a highway or street.

The six levels of service are illustrated in Figure 7, and they are defined on the following pages. The definitions are general and conceptual in nature, but may be applied to urban arterial levels of service. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them. The 1985 Highway Capacity Manual contains more detailed descriptions of the levels of service as defined for each facility type.

1. **Level-of-service A** describes primarily free flow-operations at average travel speeds usually about 90 percent of the free-flow speed for the arterial class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at signalized intersections is minimal.

2. **Level-of-service B** represents reasonable unimpeded operations at average travel speeds usually about 70 percent of the free-flow speed for the arterial class. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tension.

3. **Level-of-service C** represents stable operations. However, ability to maneuver and change lanes in mid-block locations may be more restricted than in LOS B, and longer queues and/or adverse signal coordinations may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial class. Motorists will experience an appreciable tension while driving.

4. **Level-of-service D** borders on a range on which small increases in flow may cause substantial increases in approach delay and, hence, decreases in arterial speed. Delay may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free-flow speed.

5. **Level-of-service E** is characterized by significant approach delays and average travel speeds of one-third the free-flow speed or lower. Such operations are caused by some combination of adverse progression, high signal density, extensive queuing at critical intersections, and inappropriate signal timing.

---

[1] Highway Capacity Manual, Special Report 209, 1985, p. 1-3

6. **Level-of-service F** characterizes arterial flow at extremely low speeds below one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with high approach delays resulting. Adverse progression is frequently a contributor to this condition.

The recommended improvements and overall design of the Thoroughfare Plan were based on achieving a minimum of LOS D on existing facilities, and LOS C on new facilities. LOS D is considered the **"practical capacity"** of a facility, or that at which the public begins to express dissatisfaction.

Capacity Deficient Corridors

A good indication of the adequacy of the existing major street system is a comparison of the traffic volumes with the ability of the streets to move traffic freely at a desirable speed. The ability of a street to move traffic freely, safely, and efficiently with a minimum delay is controlled principally by the spacing of signs or traffic signals utilized. Thus, the ability of a street to move traffic can be increased by restricting parking and turning movements, using proper sign and signal devices, and by the application of other traffic engineering techniques.

Capacity is the maximum number of vehicles that has a reasonable expectation of passing over a given section of a roadway in one direction, or in both directions, during a given period under prevailing roadway and traffic conditions The relationship of traffic volumes to the capacity of the roadway will determine **level of service** being provided. Six levels of service have been selected to identify the conditions existing under various speed and volume conditions on a highway or street.

The six levels of service are illustrated in Figure 7, and they are defined on the following pages. The definitions are general and conceptual in nature, but may be applied to urban arterial level of services. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them. Each chapter of the 1985 Highway Capacity Manual contains more detailed descriptions of the levels of service as defined for each facility type.

There are no severe capacity problems on the mainland of Hyde County through the 20-25 year planning period. The most notable problem is the roadway width of US 264 through the County with its varying pavement widths from 20 to 24 feet. The sharp curves on this route have speed restrictions of 25 miles per hour. Width and curvature limit the capacity of the roadway.

On Ocracoke Island, the capacity problem studied involved the section of NC 12 from the ferry terminal at Ocracoke Lake to a point where the roadway becomes 24 feet wide. The problem that occurs is not due to an excessive number of vehicles but the 20 feet of pavement without shoulders. Automobiles must share the road with pedestrians and bicyclists, with very little off-street parking to serve day-visitors. Traffic congestion regularly occurs along NC 12 during the summer months.

Touring bicyclists on Ocracoke are either touring bicyclists arriving on the Ceder Island Ferry or are people renting bicycles for short duration recreational trips around the village. Long distance bicycle tourists are usually skilled riders with a specific destination in mind; for these reasons, touring cyclists contribute to little, if any, traffic congestion on Ocracoke roadways. By contrast, rental bicycles are creating considerable traffic congestion on a one-half mile segment of roadway from the visitors' center to the intersection of Silver Lake Road (SR 1328). The Bicycle Routes on Ocracoke Island are shown in Figure 8. Recommendations for bicyclists will be made in the next chapter.

The arterial and collector routes of Hyde County were analyzed by use of the volume/capacity ratio (V/C), using projected 2020 traffic volumes over the practical capacity for the facility. A V/C ratio of greater than 1.0 is tolerable, but much over 1.0 is intolerable.

No other streets on the existing network will be approaching capacity by the design year 2020. Several facilities in the county have less than 24 feet of pavement and inadequate shoulders.

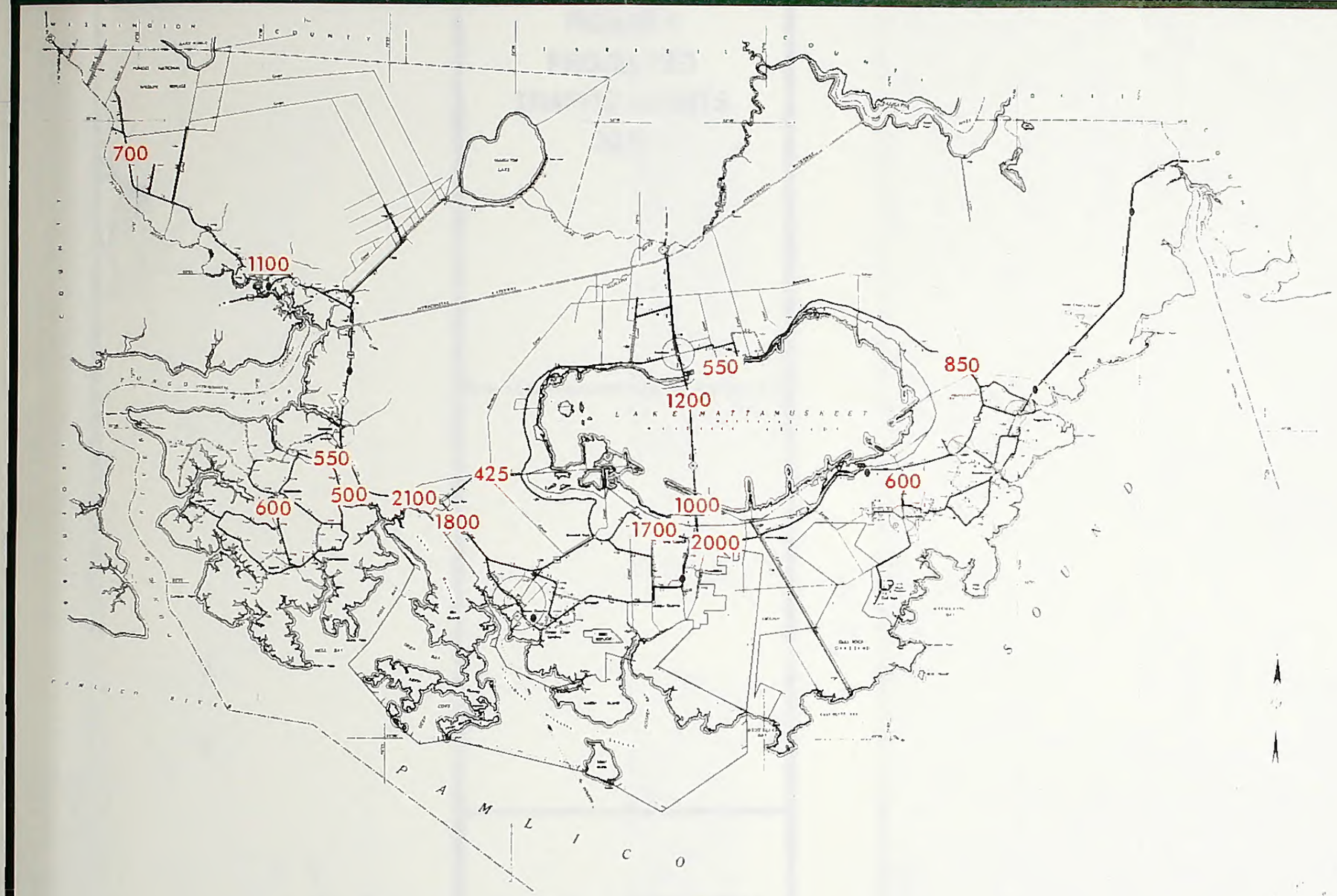
Intersection Deficiencies

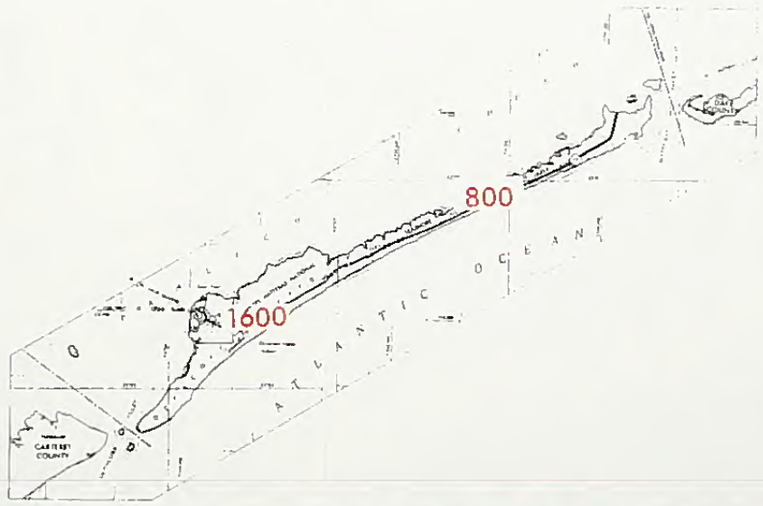
A good indication of the adequacy of the existing major street system is a comparison of the traffic volumes with the ability of the streets to move traffic freely at a desirable speed. The ability of a street to move traffic freely, safely, and efficiently with a minimum delay is controlled principally by the spacing of signs or traffic signals utilized. Thus, the ability of a street to move traffic can be increased by restricting parking and turning movements, using proper sign and signal devices, and by the application of other traffic engineering techniques.

No intersections in Hyde County need to be improved due to poor traffic movement or driver safety.

FIGURE 5

1991 TRAFFIC COUNTS





HYDE COUNTY

NORTH CAROLINA

PREPARED BY THE

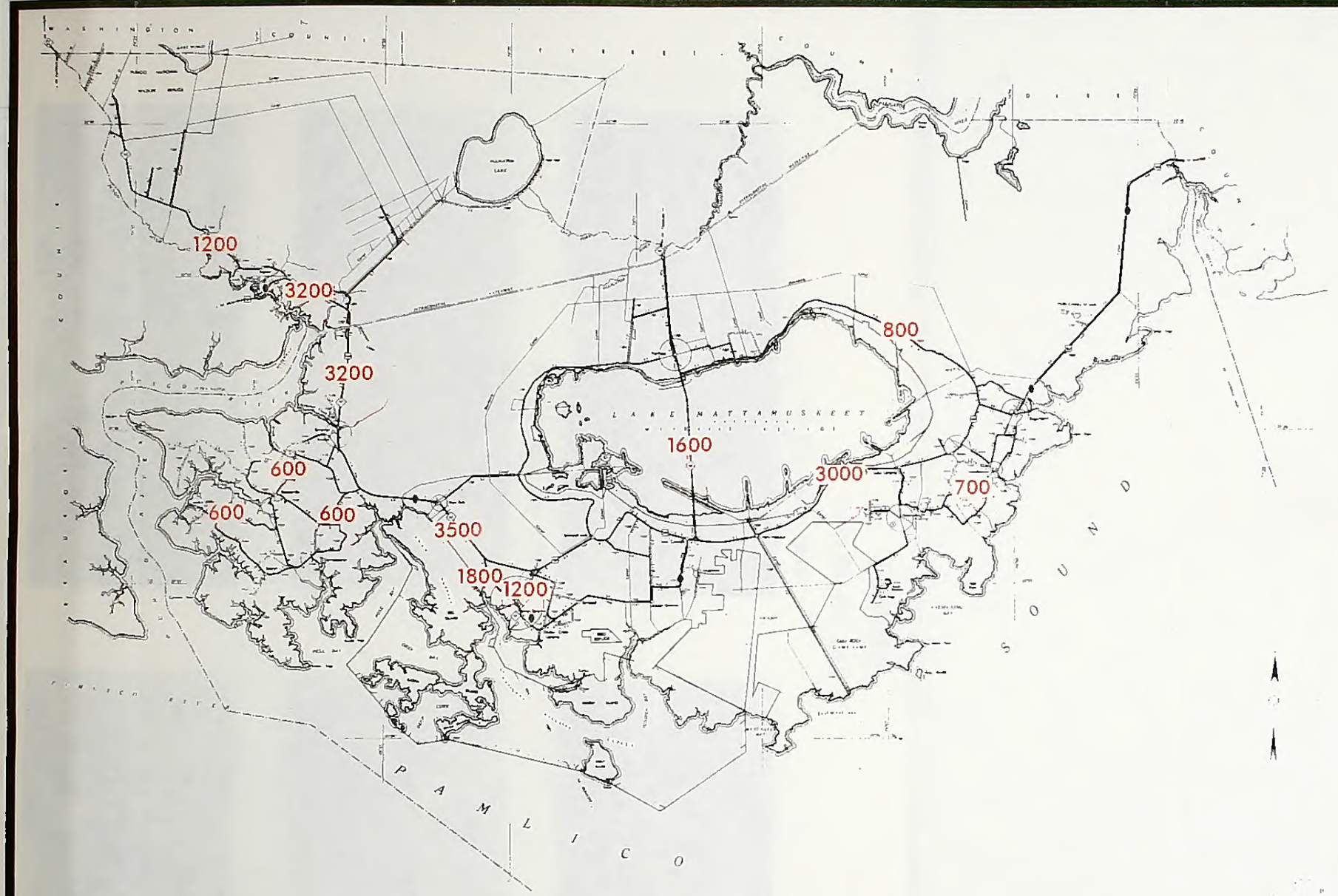
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS — PLANNING AND RESEARCH BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION



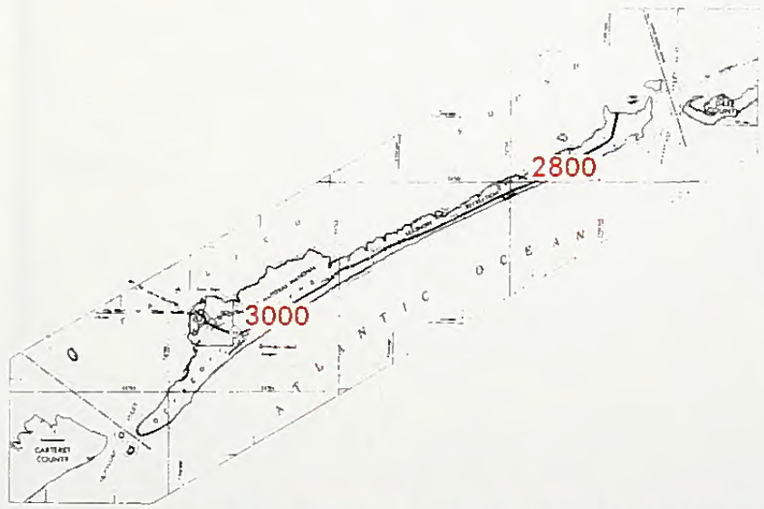


FIGURE 6
PROJECTED
TRAFFIC COUNTS
2020

HYDE COUNTY

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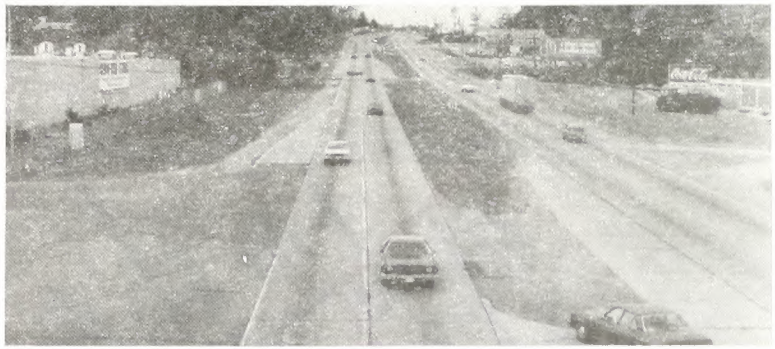
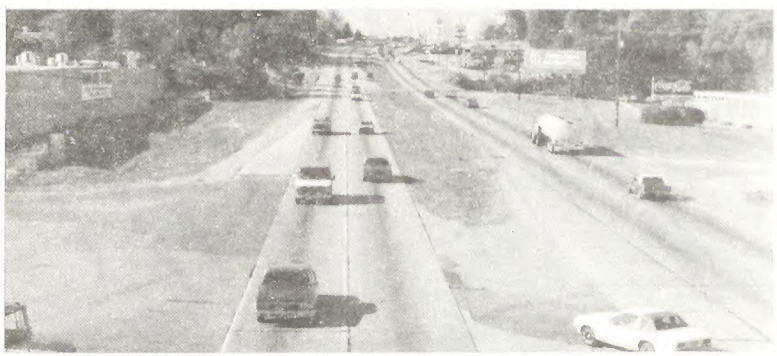


LEVEL OF SERVICE - A

LEVEL OF SERVICE - D



LEVEL OF SERVICE - B

LEVEL OF SERVICE - E

LEVEL OF SERVICE - C

LEVEL OF SERVICE - F

LEVELS OF SERVICE

FIGURE 7

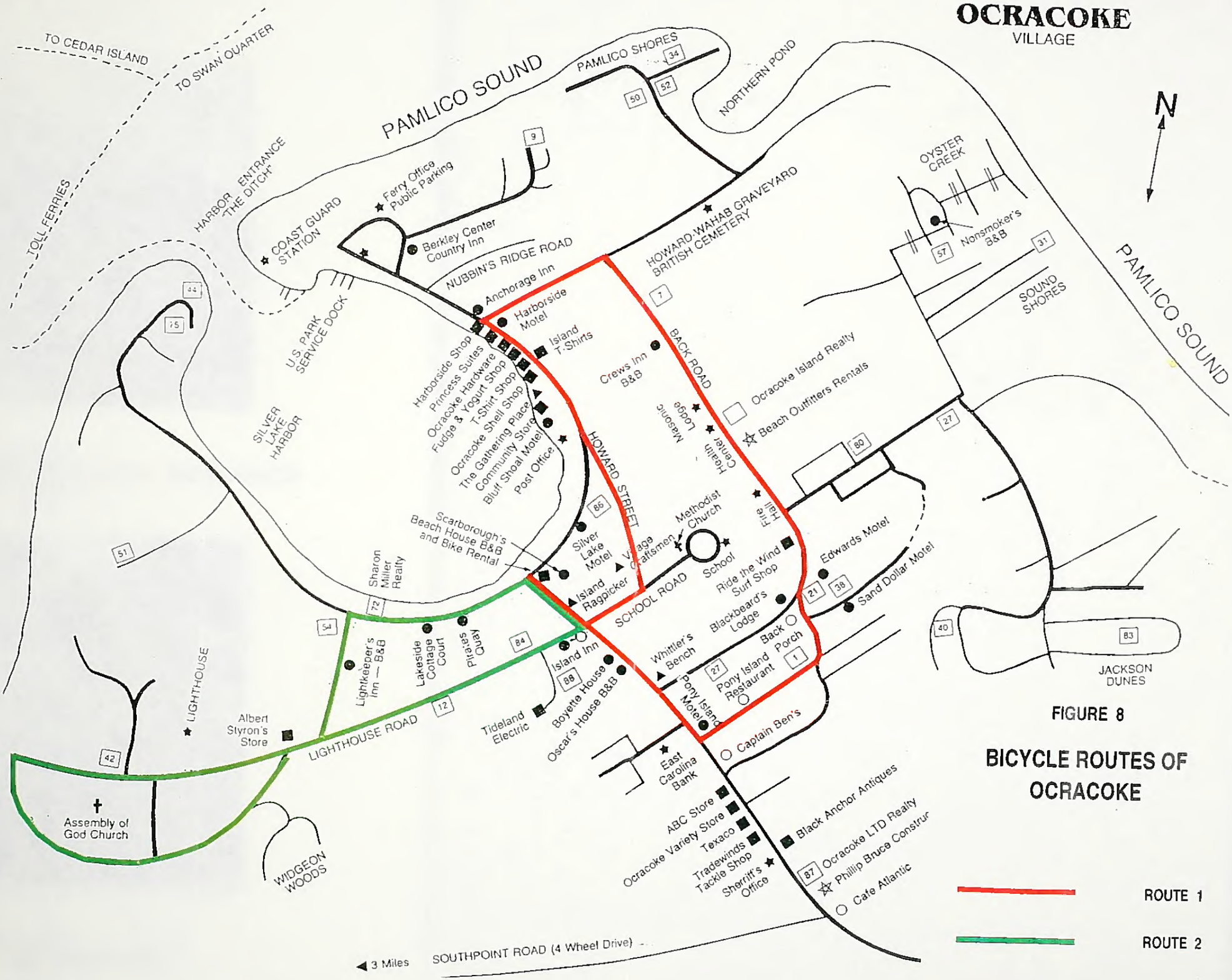


FIGURE 8

BICYCLE ROUTES OF OCRACOKE

PHOTO LOG OF SELECTED NEEDS

NC 12, OCRACOKE
(DEVELOPMENT NEAR EDGE OF PAVEMENT-PEDESTRIANS AND BICYCLISTS USING ROADWAY)

NC 12, OCRACOKE
(DEVELOPMENT NEAR EDGE OF PAVEMENT)

NC 12, OCRACOKE
(DEVELOPMENT AND PEDESTRIANS NEAR ROADWAY)

NC 12, OCRACOKE
(BICYCLISTS AND PEDESTRIANS USING ROADWAY)

BRIDGE, OYSTER CREEK, OCRACOKE
(DEFICIENT BRIDGE)

RESIDENTIAL STREET, OCRACOKE

Chapter 4

RECOMMENDATIONS

The recommended thoroughfare plan for Hyde County is shown in Figure 10. More detail on physical and operational characteristics is given in Appendix A, Table 1.

There are many two-lane facilities in the area that are less than 24 feet wide (12-foot lanes). It is desirable from an operations and safety standpoint that all roads with less than 24 feet of pavement be widened to 24 feet. These facilities are given in Appendix A, Table 1.

Elements of the Hyde County Thoroughfare Plan are as follows:

Minor Arterial

This is the facility that serves primarily through traffic movements in the County.

1. US 264

Recommendations for the Minor Arterial

Listed below are the suggested improvements for the minor arterial in Hyde County during the period of 1990-2020.

US 264 - This two-lane facility extends east-west through the County from Beaufort County to Dare County. This facility is the major highway in the County lying south of Lake Mattamuskeet and is the connecting link for many small communities in the County. The roadway width through the county varies from 20 to 24 feet with grass shoulders. The speed limit is 55 MPH through most of the facility but sharp curves and several small communities lower the speed limit through specific areas.

The North Carolina Department of Transportation makes continuous improvements on the facility mostly through the division maintenance personnel. For increased safety and capacity, it is recommended that the entire roadway be widened to 24 feet, and that the horizontal alignment be improved where feasible.

Major Collectors

The rural collector routes serve primarily intracounty travel. The major collector roads supplement the arterial system by providing an interconnecting network between smaller population centers and the arterial system.

1. NC 12
2. NC 45
3. NC 94

Recommendations for the Major Collectors

Listed below are the suggested improvements for the major collectors in Hyde County during the period of 1990-2020.

NC 12 - This facility is the only highway on Ocracoke Island except the community streets in the Village. From the Hatteras Ferry to the Pony Island Motel in the Village, NC 12 is 24 feet of pavement with grass shoulders. There are no current capacity problems and none anticipated in the future. Traffic problems occur from the ferry landing at the Coast Guard Station around Silver Lake back to the wider portion of the roadway. This problem is due to uncontrolled growth beside the roadway with no sidewalks or shoulders for pedestrians or bicyclists. According to Division I Right-of-Way Agent, J.O. Sellers, the right of way on that section of roadway is only what NCDOT maintains. NCDOT maintains the 20 feet of pavement plus one to two feet beyond the pavement on each side.

The photo log in Figure 9 shows the visual problems that exists along the roadway. Long range recommendations for Ocracoke Village to solve the problem are to keep pedestrians out of the street. Projects in Columbia and Washington, North Carolina were discussed with "Save Our Village Association" in Ocracoke and presented to the Hyde County Commissioners as possible solutions. Also, the boardwalk of Beaufort, North Carolina, was discussed and shown in photos illustrating what could possibly be a long-range solution to the problem.

NC 45 - This facility extends from Beaufort County where it intersects NC 99 and then runs parallel to the Pungo River in Hyde County intersecting US 264 at Ponzer community. NC 45 then runs simultaneous with US 264 where it extends in a southeastern direction and is the major highway into the county seat at Swan Quarter. For safety and capacity improvements, the route should be widened to the standard 24-foot rural section.

NC 94 - This is the only north-south route in Hyde County. It crosses near the middle of Lake Mattamuskeet extending

northward from US 264, crossing the Intracoastal Waterway, to the Town of Columbia in Tyrrell County. The roadway has grass shoulders with turnoffs and parking at several locations across the Lake. There are no capacity problems along the route, but widening to a standard 24-foot section will improve safety and capacity.

Minor Collectors

The minor thoroughfare roads collect traffic from the local roads and carry it to a higher system facility.

1. North Lake Road (SR 1311)
2. Piney Woods Road (SR 1305)
3. Turnpike Road (SR 1304)
4. Hodges Road (SR 1139)
5. Swindell Road (SR 1141)
6. Smith Creek Road (SR 1143)
7. Sladesville Road (SR 1148)
8. Dunbar Road (SR 1152)
9. Main Street (SR 1103, Englehard)
10. Gas Plant Road (SR 1104)
11. Nebraska Road (SR 1110)
12. Watson Road (SR 1116)
13. Scranton Road (SR 1153)
14. Main Street (SR 1129, Swan Quarter)

Recommendations for Minor Collectors

Listed below are the suggested improvements for the minor collector system in the Hyde County planning area during the period of 1990-2020.

North Lake Road (SR 1311) and Piney Woods Road (SR 1305) - These roads form a loop around most of Lake Mattamuskeet except where US 264 lies south of the lake, and give recreational access to hunters and fishermen. There are no capacity problems on these routes, but widening to the standard 24 foot section is recommended.

Turnpike Road (SR 1304) - This facility serves as a connector to the west side of the lake from US 264 and is the western access point to the lake. There are no anticipated problems on this route.

Hodges Road (SR 1139), Scranton Road (SR 1153), Swindell Road (SR 1141), Smith Creek Road (SR 1143), Sladesville Road (SR 1148), and Dunbar Road (SR 1152) - These routes serve the communities of Sladesville, Beulah, and Germantown near the Pungo River basin for agricultural and recreational fishing. There are no capacity problems on these routes, but these routes should be improved to secondary road standards.

Main Street (SR 1103, Englehard), Gas Plant Road (SR 1104), Nebraska Road (SR 1110), and Watson Road (SR 1116) -These routes serve the communities of Nebraska, Middletown, and Engelhard in the eastern part of the county near the Pamlico Sound. No capacity problems are anticipated on these routes, but widening is recommended to the standard 24 foot cross-section.

Main Street (SR 1129, Swan Quarter) - This facility serves as a connector between US 264 and NC 45.

Ferry Operations

The existing ferry service is adequate to meet current demands of Hyde County. However, the Hyde County Commissioners are interested in relocating the ferry terminal from Swan Quarter to Outfall Canal at East Bluff Bay to shorten crossing time, decrease operating expenses, and probably increase ferry use. The location of the ferry terminal to Outfall Canal was addressed by Planning and Environmental Branch, Division of Highways, North Carolina Department of Transportation, through a project report and environmental statement under Project Number 6.804043 in January of 1975, prepared by R.G. Dawson, Jr., P.E.

The Hyde County Commissioners have requested a new feasibility study on the relocation of the existing site to Outfall Canal at the time of this writing.

Bicycle Operations

Several bicycle improvements have been identified by Bicycle Program Staff of NCDOT which may help roadway users in the Ocracoke area. Traffic congestion on Ocracoke Island is partially caused by rental bicyclists.

Two types of bicycle accommodations are recommended by the Bicycle Program to help relieve traffic congestion and unsafe conditions for bicyclists:

1) It is recommended that D11-1 Bike Route signs with directional arrows should be installed to help bicyclists find acceptable roads on which to ride. A map of Ocracoke streets is shown in Figure 8 and suggests two bike routes. These routes will help to reduce traffic congestion on NC 12 by diverting bicyclists to lesser traveled roadways.

2) Edge deterioration and shoulder condition along NC 12 from the ferry landing to the intersection of Silver Lake Road (SR 1328) should be repaired to improve safety and capacity for both cyclists and motorists.

Construction Improvements and Cost Estimates

Construction priorities will vary depending on what criteria are considered and what weight is attached to the various criteria. Most people would agree that improvements to the major thoroughfare system and major traffic routes would be more important than minor thoroughfares where traffic volumes are lower. To be in the North Carolina Transportation Improvement Program, a project must show favorable benefits relative to costs and should not be prohibitively disruptive to the environment.

Project user benefits include cost savings resulting from reductions in vehicle operating costs, travel time costs, and accident costs. Estimation of project environmental impacts is one of the more difficult evaluations. Environmental factors usually considered can be divided into three major categories---physical, social, and/or cultural, and economic environmental considerations (see Table 5). Many of these are accounted for when a project is evaluated with respect to user benefits, cost, and economic potential.

Table 5

Environmental Considerations

Physical Soils and Geology	Social/Cultural Environmental	Economic Environmental
Air Quality	Housing	Businesses
Water Resources	Neighborhoods	Employment
Soils and Geology	Noise	Economic Development
Wildlife	Educational Facilities	Public Utilities
Vegetation	Churches	Transportation Costs
	Parks and Recreational Facilities	Capital Costs
	Public Health and Safety	Operation and Maintenance Costs
	National Defense	
	Aesthetics	

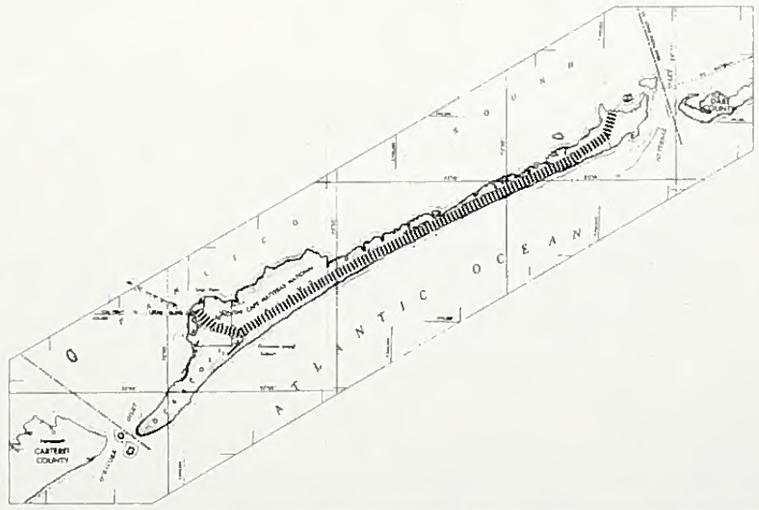
Thirteen environmental factors are generally not considered in these evaluations. They are the environmental impacts of a project on (1) air quality, (2) water resources, (3) soils and geology, (4) wildlife, (5) vegetation, (6) neighborhoods, (7) noise, (8) educational facilities, (9) churches, (10) park and recreation facilities, (11) historic sites and landmarks, (12) public health and safety, and (13) aesthetics. The summation of both positive and negative impact probabilities with respect to these factors provides a measure of the relative environmental impact of a project. The evaluation of the recommended improvements to the Hyde County highway system based on (1) user benefits, (2) costs, (3) probability that a project will stimulate economic development, (4) quantification of environmental impacts, and (5) relationship of a project to the Intrastate Highway System. A basis for evaluating how well projects meet these objectives is shown in Table 6.

TABLE 6

Hyde County Thoroughfare Plan Cost Estimates, Benefits and Probable Impact

DESCRIPTION	ROW COST $1000	CONST. COST $1000	USER BENEFITS $1000	ECONOMIC DEVELOPMENT	ENVIRONMENTAL IMPACTS POSITIVE	NEGATIVE
US 264 (widen)		23,900	72,800	.6	.4	.4
NC 12 (Ocracoke)		35	55,600	.5	.3	.4
Bridge (Bay Bridge Rd) (Oyster Creek)		500	25,900	.2	.4	.6

NOTE: AMOUNTS ARE IN $ X 1000



LEGEND		
HIGHWAY CLASSIFICATIONS	EXISTING	PROPOSED
PRINCIPAL ARTERIALS		
MINOR ARTERIALS		
MAJOR COLLECTORS		
MINOR COLLECTORS		
URBAN FREEWAY OR EXPRESSWAY		
URBAN MAJOR THOROUGHFARE		
URBAN THOROUGHFARE PLANNING AREA BOUNDARY		

ADOPTED BY:

HYDE COUNTY SEPTEMBER 8, 1992

STATEWIDE PLANNING BRANCH OCTOBER 12, 1992

N.C. DEPT. OF TRANSPORTATION NOVEMBER 6, 1992

PUBLIC HEARING SEPTEMBER 8, 1992

THOROUGHFARE PLAN

HYDE COUNTY

NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS – PLANNING AND RESEARCH BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

AUGUST 3, 1992

SCALE

FIGURE 10

Chapter 5

ADMINISTRATIVE CONTROLS AND IMPLEMENTATION TOOLS

State and Municipal Adoption of the Thoroughfare Plan

Chapter 136, Article 3A, Section 136-66.2 of the General Statutes of North Carolina provides that after development of a thoroughfare plan, the plan may be adopted by the governing body of the municipality and the Department of Transportation to serve as the basis for future street and highway improvements. The General Statutes also require that, as part of the plan, the governing body of the municipality and Department of Transportation shall reach agreement on responsibilities for existing and proposed streets and highways included in the plan. Facilities which are designated a State responsibility will be constructed and maintained by the Division of Highways. Facilities which are designated a municipal responsibility will be constructed and maintained by the municipality.

After mutual plan adoption, the Department of Transportation will initiate negotiations leading to determining which of the existing and proposed thoroughfares will be a Department responsibility and which will be a municipal responsibility. Chapter 136, Article 3A, Section 136-66.1 of the General Statutes provides guidance in the delineation of responsibilities. In summary, these statutes provide that the Department of Transportation shall be responsible for those facilities which serve volumes of through traffic and traffic from outside the area to major business, industrial, governmental, and institutional destinations located inside the municipality. The municipality is responsible for those facilities which serve primarily internal travel.

Unless implementation is an integral part of the transportation planning process, the effort and expense associated with developing a plan is lost. To neglect the implementation process is a three-fold loss . . . . the loss of the capital expenditures used in developing a plan, the opportunity cost of the capital expenditures, and more importantly the loss of the benefits which would accrue from an improved transportation system.

Administrative controls and implementation tools which can aid in the implementation process are generally available to cities and municipalities through Federal and State Legislation. These controls and tools will be discussed in this chapter. They include: Subdivision Regulations, Zoning Ordinances, Official Maps, Urban Renewal, Capital Improvements Programs, and Development Reviews. Generally, two issues play a major role in the implementation process - available finances and citizen involvement. Effective use of the controls and tools listed above are indicative of good planning and minimize the effects of

limited finances and negative citizen reaction to specific elements of a plan. It is through good planning that maximum use is made of every available dollar and that citizen involvement and approval of the transportation plan is obtained.

Subdivision Regulations

Subdivision regulations are locally adopted laws governing the process of converting raw land into building sites. From the planner's view, subdivision regulations are important at two distinct levels. First, they enable him to coordinate the otherwise unrelated plans of a great many individual developers. This process assures that provision is made for land development elements such as roadway right-of-way, parks, school sites, water lines and sewer outfalls, and so forth. Second, they enable him to control the internal design of each new subdivision so that its pattern of streets, lots, and other facilities will be safe, pleasant, and economical to maintain.

To be most effective, subdivision regulations and their administration must be closely coordinated with other local governmental policies and ordinances. Among the more important of these are the Comprehensive Growth Plan, Utilities Extension Master Plan, and Thoroughfare Plan.

In practice, subdivision regulations can provide some very positive benefits such as requiring portions of major streets to be constructed in accordance with the Thoroughfare Plan, or requiring subdividers to provide for the dedication and/or reservation of rights-of-way in advance of construction. These practices reduce the overall cost of the plan by having some costs borne by developers. Projects in Lake Waccamaw that could be implemented or protected by subdivision ordinances are Pauls Road/ Top Tobacco Co. Extension, West Oak/East Oak Extension, and White Oak and Smart Street Extension.

Recommended Subdivision Ordinances are included in Appendix B.

Zoning Ordinances

Zoning is probably the single most commonly used legal device available for implementing a community's land-use plan. To paraphrase the U.S. Department of Commerce 1924 Standard Zoning Enabling Act, on which most present-day legislation is based, zoning may be defined as the division of a municipality (or other governmental unit) into districts, and the regulation within the districts of:

1. the height and bulk of buildings and other structures,
2. the area of a lot which may be occupied and the size of required open spaces,

3. the density of population, and
4. the use of buildings and land for trade, industry, residence, or other purposes.

The characteristic feature of the zoning ordinance that distinguishes it from most other regulations is that it differs from district to district, rather than being uniform throughout a city. Thus, a given area might be restricted to single-family residential development with minimum lot size requirements and setback provisions appropriate for development. In other areas, commercial or industrial development might be permitted, and regulations would be enacted to control such development. Building code provisions or sanitary regulations, on the other hand, normally apply to all buildings in a certain category regardless of where they may be situated within a city.

The zoning ordinance does not regulate the design of streets, utility installation, the reservation or dedication of parks, street rights-of-way, school sites, and related matters. These are controlled by subdivision regulations or possibly by use of an official map. The zoning ordinance should, however, be carefully coordinated with these and other control devices.

Official Maps

The roadway corridor official map (or official map) map is a document, adopted by the legislative body of the community, that pinpoints and preserves the location of proposed streets against encroachment. In effect, the official map serves notice on developers that the State or municipality intends to acquire certain specific property. The official map serves as a positive influence for sound development by reserving sites for public improvements in anticipation of actual need.

The NCDOT position is that it will limit the use of official maps to large scale, fully access controlled facilities planned for rapidly developing areas outside of municipal jurisdictions. For projects within municipal jurisdictions, official maps should be prepared and adopted by the local government. Municipalities may adopt official maps that extend beyond its extraterritorial jurisdiction with approval from the Board of County Commissioners.

It should be recognized that an official map places severe but temporary restrictions on private property rights. These restrictions are in the form of a prohibition, for up to three years, on the issuance of building permits or the approval of subdivisions on property lying within an official map alignment. The three year reservation period begins with the request for development approval. This authority should be used carefully and only in cases where less restrictive powers are found to be ineffective.

Requests for NCDOT to prepare and adopt an official map should be directed to the manager of the Program and Policy Branch. For cities contemplating the adoption of an official map, there are two ways in which the city may proceed. The first is to consider the official map statute as a stand-alone authority and use it as the basis for local adoption of an official map. Alternatively, the second approach is to adopt a local ordinance modeled after the statute, but modified to fit local circumstances and clarify the statute. Regardless of the approach taken, several procedural steps will need to be considered, such establishing procedures for consideration of variance petitions.

Once the project has been selected and the alignment determined, maps must be prepared that are suitable for filing with the county Register of Deeds Office. The map should show the proposed alignment in sufficient detail to identify the functional design and the preliminary right-of-way boundaries. Since the purpose of the map is to show the effect on properties along the project path, the existing property boundaries should be identified. As an additional requirement, within one year of the adoption of an official map, work must begin on an environmental impact study or preliminary engineering.

It is important to recognize the risks inherent in the adoption of an official map prior to completing the environmental studies. Projects to be funded using any federal funds require the unbiased evaluation of alternative alignments. This means that other alternatives will be studied and compared to the protected alignment. [1]

The above information is only to serve as an introduction to official maps, and in no way provides the information necessary to begin development of an official map. The Program and Policy Branch of the North Carolina Department of Transportation is responsible for facilitating the adoption of Official Street Maps. Cities considering Official Street Map projects should contact this Branch for their "Guidelines for Municipalities Considering Adoption of Roadway Corridor Official Maps" at:

Programming and Policy Branch
NC Department of Transportation
P.O. Box 25201
Raleigh, North Carolina 27611

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[1] "Guidelines for Municipalities Considering Adoption of Roadway Corridor Official Maps", prepared by NCDOT Program and Policy Branch.

Urban Renewal

Urban renewal plays a minor role in the transportation planning implementation process in terms of scope and general influence. However, under the right circumstances, renewal programs can make significant contributions. Provisions of the New Housing Act of 1974 (as amended) call for the conservation of good areas, rehabilitation of declining areas, and clearance of slum areas. In the course of renewal, it is important to coordinate with the Thoroughfare Plan to see if additional set-backs or dedication of rights-of-way are needed.

Continued use of urban renewal programs to improve the transportation system is encouraged. Changes that can be made under this program are generally not controversial or disruptive given the trauma of the clearance of a significant area.

Capital Improvement Programs

Capital programs are simply the coordination of planning and money. The capital improvements program, with respect to transportation, is a long range plan for the spending of money on street improvements, acquisition of rights-of-way and other improvements within the bounds of projected revenues. Municipal funds should be available for construction of street improvements which are a municipal responsibility, right-of-way cost sharing on facilities designated a Division of Highways responsibility and advance purchase of right-of-way where such action is warranted.

Historically cities and towns have depended, to a great degree, on Federal or State funding to solve their transportation problems. Chapter 136-Article 3A of the Road and Highway Laws of North Carolina clearly outlines the responsibilities and obligations of the various governmental bodies regarding highway improvements. North Carolina Highway Bill 1211, passed in 1988, limits the role of municipalities to specific limits in right-of-way cost sharing. Set-back regulations, right-of-way dedications and reservations play a major role in the ultimate cost of many facilities. Only in special cases will the municipality be able to enjoy the benefits of highway improvement without a some form of investment.

Development Reviews

Driveway access to a State-maintained street or highway is reviewed by the District Engineer's office and by the Traffic Engineering Branch of the North Carolina Department of Transportation prior to access being allowed. Any development expected to generate large volumes of traffic (ie. shopping centers, fast food restaurants, large industries, etc.) may be comprehensively studied by staff from the Traffic Engineering, Planning and Research, and Roadway Design Branches of NC DOT. If

done at an early stage, it is often possible to significantly improve the development's accessibility at minimal expense. Since the municipality is the first point of contact for developers, it is important that the municipality advise them of this review requirement and cooperate in the review process.

Other Funding Sources

1. Assess user impact fees to fund transportation projects. These fees, called "facility fees" in the legislation, are to be based upon "reasonable and uniform considerations of capital costs to be incurred by the town as a result of new construction. The facility fee must bear a direct relationship to additional or expanded public capital costs of the community service facilities to be rendered for the inhabitants, occupants of the new construction, or those associated with the development process".

2. Enact a bond issue to fund street improvements.

3. Continue to work with NCDOT to have local projects included in the Transportation Improvement Program (TIP).

4. Consider the possibility of specific projects qualifying for federal demonstration project funds.

5. Adopt a collector street plan that would assess buyer or property owners for street improvement.

6. Charge a special assessment for utilities; for example, increase water and sewer bills to cover cost of street improvements.

7. Table 7, below, lists projects and implementation suggestions to develop the thoroughfare plan.

Table 7

Procedures and Programs Recommended for Implementation of Projects

Project	State Construction: Rural Primary System	Urban System	Bridge Replacement	Secondary Roads
US 264 (widen)	X			
NC 12 (Ocracoke)	X			
Bridge (Bay Ridge) (Oyster Creek)			X	

Project	City Programs and Ordinances: Const.	Redev.	Block Grants	Bond	Subdiv. Ord.	Zoning Ord.	Future Street Lines	Adv. ROW Purchase
US 264 (widen)								
NC 12 (Ocracoke)					X	X		
Bridge (Bay Ridge) (Oyster Creek)	X				X	X		

APPENDICES

Appendix A

TYPICAL CROSS SECTIONS

Typical cross sections recommended by the Thoroughfare Planning Unit are shown in Appendix A, Figure 1, and listed in Appendix A, Table 1.

Cross section "A" is illustrative for controlled access freeways. The 46 foot grassed median is the least desirable median width, but there could be some variation from this depending upon design considerations. Slopes of 8:1 into 3 foot drainage ditches are desirable for traffic safety. Right-of-way requirements would typically vary upward from 250 feet depending upon cut and fill requirements.

Cross section "B" is typical for four lane divided highways in rural areas which may have only partial or no control of access. The minimum median width for this cross section is 30 feet, but a wider median is desirable. Design requirements for slopes and drainage would be similar to cross section "A", but there may be some variation from this depending upon right-of-way constraints.

Cross section "C", seven lane urban, and cross section "D", five lane urban, are typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "E" and "F" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections.

Cross section "G" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 24 feet is recommended with 30 feet being desirable.

Typical cross section "H" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections.

Thoroughfares which are proposed to function as one-way traffic carriers would typically require cross section "I". Cross section "J" and "K" are usually recommended for minor thoroughfares since these facilities usually serve both land service and traffic service functions. Cross section "J" would be used on those minor thoroughfares where parking on both sides is needed as a result of more concentrated development.

Cross section "L" is used in rural areas or for staged construction of a wider multilane cross section. On some

thoroughfares projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time.

The curb and gutter urban cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to move the sidewalk further away from the street to provide added separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

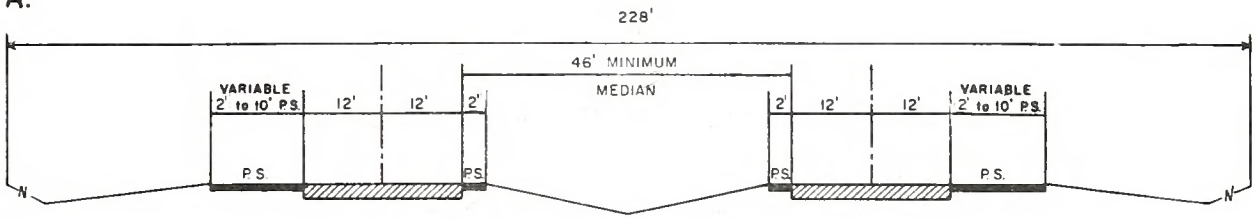
Rights-of-way shown for the typical cross sections are the minimum rights-of-way required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

If there is sufficient bicycle traffic along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to allow for the bicycle facilities. The North Carolina Bicycle Facility and Program Handbook should be consulted for design standards for bicycle facilities.

Recommended typical cross sections for thoroughfares were derived on the basis of projected traffic, existing capacities, desirable levels of service and available right-of-way.

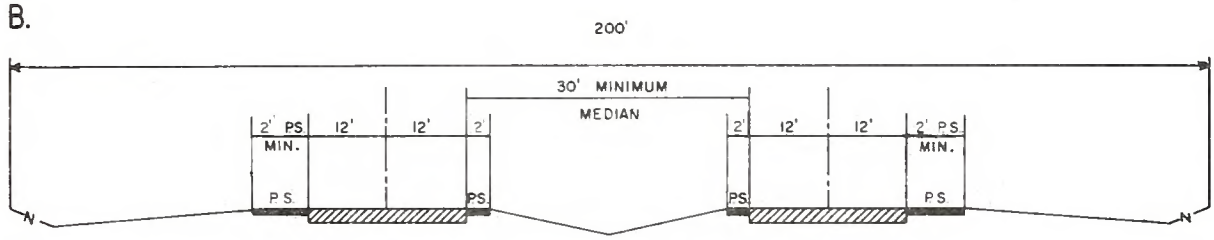
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



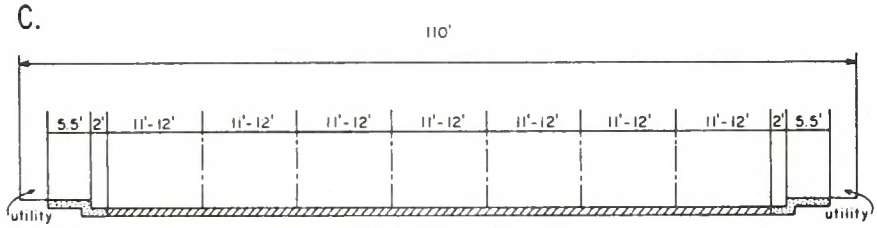
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



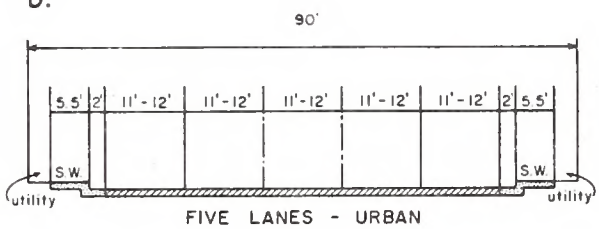
FOUR LANES DIVIDED WITH MEDIAN - RURAL

C.



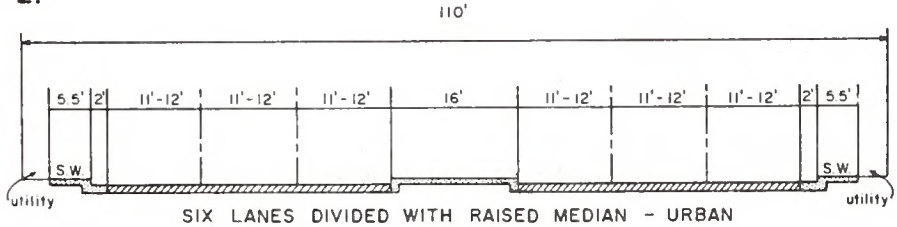
SEVEN LANES - URBAN

D.



FIVE LANES - URBAN

E.

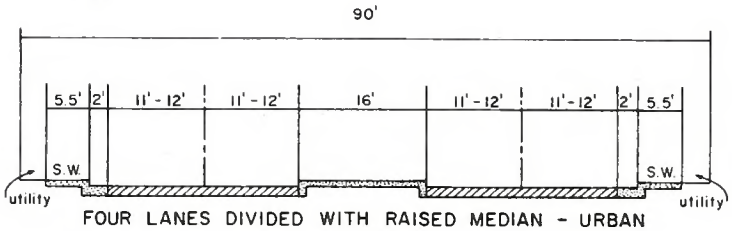


SIX LANES DIVIDED WITH RAISED MEDIAN - URBAN

FIGURE A-1

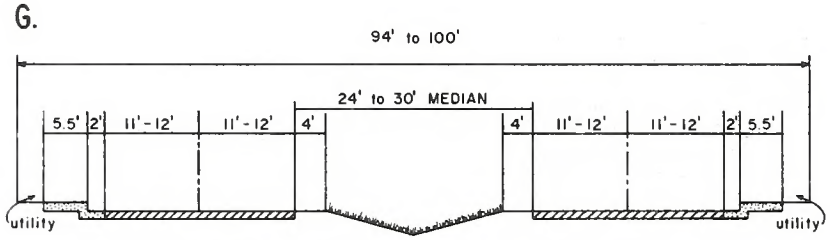
TYPICAL THOROUGHFARE CROSS SECTIONS
(CONTINUED)

F.



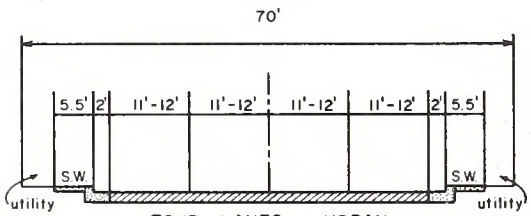
FOUR LANES DIVIDED WITH RAISED MEDIAN - URBAN

G.



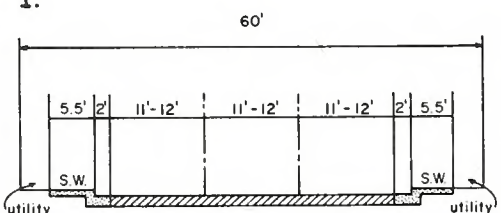
FOUR LANES DIVIDED - URBAN BOULEVARD
GRASS MEDIAN

H.



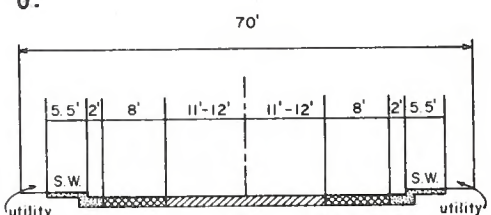
FOUR LANES - URBAN

I.



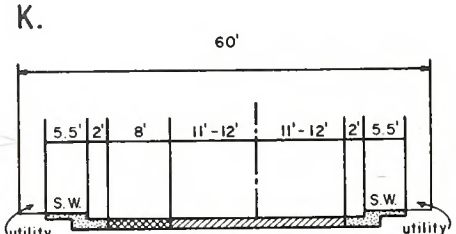
THREE LANES - URBAN

J.



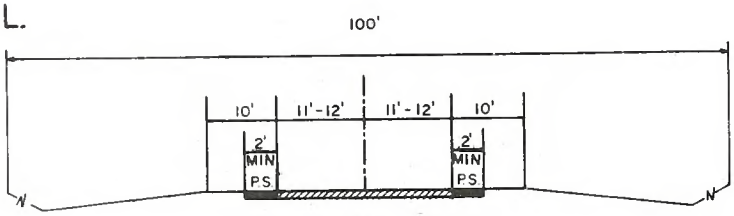
TWO LANES - URBAN
PARKING ON EACH SIDE

K.



TWO LANES - URBAN
PARKING ON ONE SIDE

L.



TWO LANES - RURAL

TABLE A-1

THOROUGHFARE PLAN STREET TABULATION AND RECOMMENDATIONS

FACILITY & SECTION	EXISTING X - SECTION DIST MI	RDWY FT	ROW FT	CAPACITY CURRENT (FUTURE)	VOLUMES ADT 1991	2020	RECOMMENDED X - SECTION RDWAY (ULT)	ROW (ULT)
US 264								
Beaufort Co to SR 1302	2.40	22	60	6,400	1850	3200	L	ADQ
SR 1302 to SR 1156	4.43	24	60	7,200	1750	3200	ADQ	ADQ
SR 1156 to SR 1129	10.3	22	60	6,400	1900	3500	L	ADQ
SR 1129 to Dare Co	33.3	20	60	5,400	1600	3000	L	ADQ
NC 12								
Hatteras F. to SR 1328	14.9	22	150	6,400	1500	2800	L	ADQ
SR 1328 to Ocracoke F.	.85	20	22	3,200	1500	3000	L	(45)
NC 45								
Beaufort Co to US 264	14.5	20	60	5,400	650	1200	L	ADQ
US 264 to Swan Quarter	5.20	20	60	5,400	900	1800	L	ADQ
NC 94								
Tyrell Co to US 264	11.2	20	60	5,400	1000	1600	L	ADQ
North Lake Rd. (SR 1311)								
NC 94 to US 264	9.37	20	60	5,400	600	800	L	ADQ
Piney Woods Rd.(SR 1305)								
NC 94 to US 264	9.70	20	60	5,400	450	750	L	ADQ
Turnpike Road (SR 1304)								
US 264 to SR 1305	3.30	18	60	3,200	300	500	L	ADQ
Main Street (SR 1129)								
NC 45 to US 264	1.46	20	60	5,400	800	1200	L	ADQ
SR 1103, SR 1101, SR 1104 SR 1110, and SR 1116								
Engelhard to Lake Landing	14.3	18	60	3,200	400	700	L	ADQ
SR 1139, SR 1143, SR 1148, and SR 1152								
Scranton to US 264	16.5	18	60	3,200	350	600	L	ADQ

ADQ - ADEQUATE

NA - NOT AVAILABLE

Appendix B

RECOMMENDED SUBDIVISION ORDINANCES

DEFINITIONS

I. Streets and Roads:

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intrastate and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.

4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Interstate, Intrastate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

C. Specific Type Rural or Urban Streets

1. Freeway - Divided multilane highways designed to carry large volumes of traffic at higher speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. (Design speed 70 mph, Operating speed 55 mph to 65 mph)

2. Secondary Freeway - A divided multilane roadway designed to carry moderate volumes of traffic at moderate speeds. The facility provides for the continuous flow of traffic through full control of access and the provision of interchanges or grade separation with no access at cross roads, and no traffic signals. (Design speed 50-55 mph, Operating speed 40-45 mph)

3. Parkway - A divided multilane roadway for noncommercial traffic, with full or partial control of access. Grade separations are provided at major intersections and there are no traffic signals.

4. Expressway - A divided multilane roadway designed to carry heavy volumes of traffic with full or partial control of access. Interchanges are provided at major intersections. There may be access to service roads and local streets, but there will be no signalized intersections.

5. Secondary Expressway - A divided multilane roadway designed to carry moderate volumes of traffic at moderate speeds. This facility may have partial control of access with right turn in and right turn out access to abutting property, and interchanges at major intersections. Some minor intersections may have traffic signal control.

6. Urban Arterial - Multilane roadway with signalized intersections, and access to abutting property. May have grass or barrier type median, or middle left turn lane.

7. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

8. Local Residential Street - Cul-de-sacs, loop streets less than 2,500 feet in length, or streets less than one mile in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

9. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

10. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

11. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides of develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or recombination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than ten acres where no street right-of-way dedication is involved, (3) widening of opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than two acres into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

DESIGN STANDARDS

I. Streets and Roads

The design of all roads within Hyde County shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by Hyde County.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out the Thoroughfare Plan.

	Min. ROW
1. Rural	
a. Principle Arterial	
Freeways	350 ft.
Other	200 ft.
b. Minor Arterial	100 ft.
c. Major Collector	100 ft.
d. Minor Collector	80 ft.
e. Local Road	60 ft.*
2. Urban	
a. Major Thoroughfare other than Freeway and Expressway	90 ft.
b. Minor Thoroughfare	70 ft.
c. Local Street	60 ft.*
d. Cul-de-sac	Variable**

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* The desirable minimum right-of-way (ROW) is 60 ft. If curb and gutter is provided, 50 feet of ROW is adequate on local residential streets.

** The ROW dimension will depend on radius used for vehicular turnaround. Distance from edge of pavement of turnaround to ROW should not be less than distance from edge of pavement to ROW on street approaching turnaround.

The subdivider will only be required to dedicate a maximum of 100 feet of right-of-way. In cases where over 100 feet of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 100 feet. On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than sixty feet in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is subdivided, the remainder of the full required right-of-way shall be dedicated.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. Local Residential

   Curb and Gutter section: 26 feet, face to face of curb
   Shoulder section: 20 feet to edge of pavement, 4 foot shoulders

2. Residential Collector

   Curb and Gutter section: 34 feet, face to face of curb
   Shoulder section: 20 feet to edge of pavement, 6 foot shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

1. Design Speed - The design speed for a roadway should be a minimum of 5 mph greater than the posted speed limit. The design speeds for subdivision type streets shall be:

Design Speeds			
Facility Type	Design Speed		
	Desirable	Minimum	
		Level	Rolling
Rural			
Minor Collector Roads	60	50	40
Local roads including Residential Collector and Local Residential	50	50*	40*
Urban			
Major thoroughfares other than Freeways, Expressways, or Parkways	60	50	50
Minor Thoroughfares	60	50	40
Local Streets	40	40*	30**

* Based on projected annual average daily traffic of 400-750. In cases where road will serve a limited area and small number of dwelling units, minimum design speeds can be reduced further.

** Based on projected annual average daily traffic of 50-250.

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE		
Design Speed	Terrain	
	Level	Rolling
60	4	5
50	5	6
40	6	7
30		9

b. Minimum grade should not be less than 0.5% .

c. Grades for 100 feet each way from intersections (measured from edge of pavement) should not exceed 5%.

d. For streets and roads with projected annual average daily traffic less than 250, short grades less than 500 feet long, may be 150% of the value in the above table.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

Sight Distances				
Design Speed	30	40	50	60
Stopping Sight Distance				
Minimum (ft.)	200	275	400	525
Desirable Minimum (ft.)	200	325	475	650
Minimum K* Value for:				
Crest Curve	30	80	160	310
Sag Curve	40	70	110	160

(General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case.)

Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1984".

4. The "Superelevation Table" on the next page shows the maximum degree of curve and related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter of 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

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* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in feet of the vertical curve which will provide the desired sight distance.

Superelevation Table			
Design Speed	Maximum e*	Minimum Radius ft.	Max. Deg. of Curve
30	0.04	302	19 00′
40	0.04	573	10 00′
50	0.04	955	6 00′
60	0.04	1,528	3 45′
30	0.06	273	21 00′
40	0.06	509	11 15′
50	0.06	849	6 45′
60	0.06	1,380	4 15′
30	0.08	252	22 45′
40	0.08	468	12 15′
50	0.08	764	7 30′
60	0.08	1,206	4 45′

* e = rate of roadway superelevation, foot per foot

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees. No street should intersect a railroad at grade at an angle less than (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 200 feet between survey centerlines.

E. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provision is make for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least twenty (20) feet.

3. Deadend alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turnaround facilities at the deadend as may be required by the Planning Board.

F. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

G. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 30 feet from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 6 feet from the face of curb.

H. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

I. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:

   a. Shoulder section approach

      i. Under 800 ADT design year

         Minimum 28 feet width face to face of parapets of rails or pavement width plus 10 feet, whichever is greater.

      ii. 800 - 2000 ADT design year

         Minimum 34 feet width face to face of parapets of rails or pavement width plus 12 feet, whichever is greater.

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iii. Over 2000 ADT design year

Minimum width of 40 feet, desirable width of 44 feet width face to face of parapets or rails.

b. Curbs and gutter approach

i. Under 800 ADT design year

Minimum 24 feet face to face of curbs.

ii. Over 800 ADT design year

Width of approach pavement measured face to face of curbs.

Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be 1'6" minimum, or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 8' minimum, 10' desirable.)

b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

Date Due

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